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M26 Deoxynivalenol predisposes for necrotic enteritis by affecting the intestinal barrier in broilers

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Clostridium perfringens induced subclinical necrotic enteritis (NE) and mycotoxins both cause important economic losses in the broiler industry. The *Fusarium* mycotoxin deoxynivalenol (DON) is a common feed contaminant that can affect the intestinal epithelial barrier function, and may as such increase the availability of free amino acids in the intestine. This can promote the massive intestinal proliferation of *C. perfringens*. The goal of this study was to evaluate and explain the predisposing effect of DON on NE.

Therefore, an *in vivo* infection trial mimicking subclinical NE was conducted, comparing intestinal NE lesions in broilers after feeding DON at a contamination level below the European maximum guidance level of 5000 µg/kg feed, with broilers receiving non-contaminated feed. Subsequently, total and fractional nitrogen analyses were performed on the intestinal content to investigate the total protein concentration, and differentiate in proteins of animal, vegetable and bacterial origin. Furthermore, the nitrogen isotope ratio of intestinal content, intestines and diet was measured. An *ex vivo* Ussing chamber experiment was also conducted to assess the effect of DON on the barrier function of intestinal mucosa of broilers. Finally, the influence of different concentrations of DON on the growth of 8 different *C. perfringens* strains was tested *in vitro* by a well diffusion growth inhibition test and by assessment of the growth curve measuring the optical density of the *C. perfringens* culture.

Significantly more chickens showed NE lesions in the *in vivo* study when their diet was contaminated with DON. The fractional nitrogen analyses showed a relative increase in protein amount of animal origin in the intestinal content. In the Ussing chamber experiments, the duodenal tissue resistance (Rt or TEER) was significantly lower in chickens who received DON contaminated feed. This indicates an altered barrier function after exposure to DON. DON did not have an effect on the *in vitro* growth of *C. perfringens* strains.

In conclusion it is shown that feeding DON contaminated feed in concentrations below the maximum European guidance contamination level to broilers is a predisposing factor for the development of NE due to its effect on the intestinal barrier function.

Key words:
Broiler – Deoxynivalenol – Necrotic enteritis – Intestinal barrier